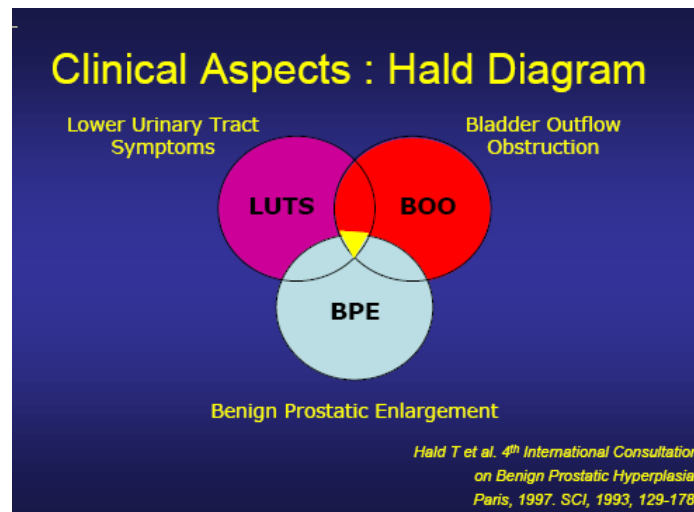


## Benign prostate hyperplasia and bladder outflow obstruction

Benign prostate hyperplasia (BPH)	histological diagnosis
Benign prostate enlargement (BPE)	clinical diagnosis based on DRE
Bladder outflow obstruction	clinical diagnosis
Lower urinary tract symptoms (LUTS)	constellation of symptoms which neither gender or organ specific

Interplay of relationships between BPH, BPE and LUTS represented by Hald diagram (shaded yellow portion represents patients with symptomatic BPH)



## Demographics

Extremely common

Difficult to ascertain prevalence as no epidemiological definition of BPH (see above)

Histologically (post-mortem; Berry 1984)

23% of men aged 41 to 50 yrs

42% of men aged 51 to 60 yrs

71% of men aged 61 to 70 yrs

82% of men aged 71 to 80 yrs

Clinically (IPSS moderate/severe; multiple studies: figures below from Olmstead County)

~ 1 in 8 men in 40s

~ 1 in 3 men > 65yrs

More common in westernised countries but ? due to reporting

Probably more common in blacks cf. asians

Risk factors

### Ageing

? epithelial cell maturation and apoptosis

Hormonal status

Increased oestrogen-androgen ratio

Increased oestrogens

Obesity

Hypercholesterolaemia

Reduced androgens

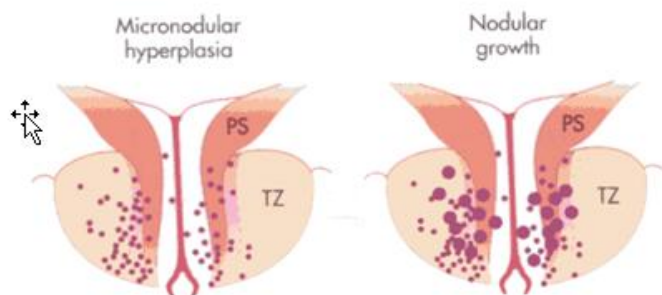
Age related (andropause)

- Hypogonadism
- Alcohol (reduced circulating androgens)
- Genetic factors
  - Increased risk on MZ twins
  - One first degree relative affected = RR x4
- Diabetes
  - Obesity and increased insulin (IGFs)

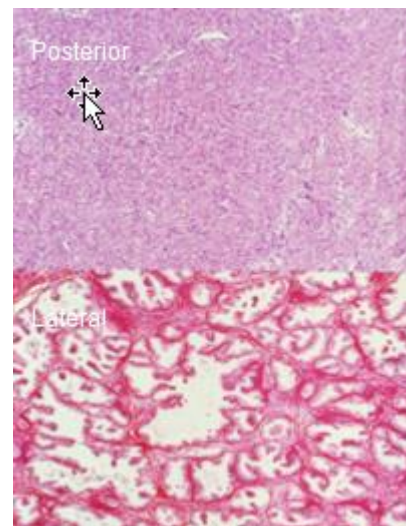
NB. No convincing evidence for vasectomy, diet, smoking status, sexual activity

### Pathology

Hyperplasia due to reduced apoptosis vs. increased proliferation  
Dysregulated stromal-epithelial interaction - normal stromal-epithelial ratio increases from 2:1 to 3:1/4:1 in BPH  
Major increase in connective tissue  
Initially micronodule formation in TZ and PUZ  
Periurethral zone      stroma  
Transition zone      stroma and glands  
Later enlargement of micronodules into - lateral (TZ) and median (PUZ) 'lobes' of BPH



**Figure 19.9** The siting of early nodules in benign prostatic hyperplasia: just below and within the collar of the preprostatic sphincter (PS) in the general area of the transitional zone (TZ).



Increased fibromuscular stroma – increased sympathetic tone (alpha 1a adrenoceptors predominate)  
Contributes to pressure-flow dynamics – antagonism with alpha blockers (non-selective, selective, super selective)  
Additional ?constricting effect of prostate capsule (humans vs. dogs)  
Pathogenesis

- (i) Androgens
  - Impair cell death, stimulate proliferation, and withdrawal associated with involution
  - No evidence androgens mitogens – believed to be permissive
  - No increased growth in cell-culture or animal models after permissive threshold reached
  - Serum androgens decline with age (intraprostatic DHT and AR levels preserved but not elevated in BPH)

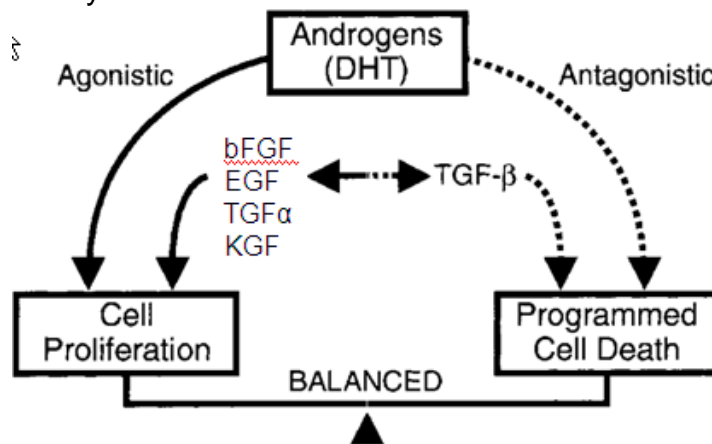
May exert effects indirectly – ?reciprocal relationship with TGF $\alpha$

(ii) Oestrogens

Animal evidence suggests oestrogens contribute to BPH  
Total and relative serum oestrogen levels increase with age  
Serum oestrogen levels higher in BPH cf. controls (increased with size)  
? Induction and stabilisation of AR

(iii) Growth factors

Prostate cell growth in culture reliant on non-plasma constituents  
Under influence of unknown stimulus\* normal stromal epithelial interaction becomes disordered  
bFGF drives proliferation in stromal cells  
KGF drives proliferation in epithelial cells  
TGF beta stimulates apoptosis in both  
\* Causes of dysregulation unclear - ?andropause vs. u-bend theory



**Evaluation**

Recommended

History

Symptom score

I-PSS score

International prostate symptom score  
Also known as AUA symptom index  
7 symptom question and one QOL question  
Symptom questions = frequency, nocturia, urgency, hesitancy, poor stream, intermittency and incomplete emptying  
Each scored 0-5; maximum score 35 (QOL score not included)

Mild	0-7
Moderate	8-19
Severe	20-35

IPSS predicts both progression and outcome

Bother score

Either question 8 on IPSS or Medical Outcomes Study Short-Form (SF-36)

Voiding diary

Polyuria > 3L/day

Nocturnal polyuria > third of daily output during 8 hours of sleep

## Examination

Abdominal exam

DRE

Assesses anal tone

May identify prostate cancer

Not accurate for predicting prostate volume – usually underestimates when volume >30ml. TRUS better.

Knee-elbow equivalent to left lateral cf. adequacy of exam

Focused neurological examination

## Urinalysis

Serum creatinine

Controversial

Rates of *progressive* renal deterioration in MTOPS minimal - not recommended by AUA. However:

Cheap to perform

Incidence of renal insufficiency at presentation ~10% (Gerber 1997)

If normal no requirement for renal tract USS (Koch 1995)

Identification of at-risk patients for surgery - renal insufficiency increases risk of complications and death after TURP

## Optional

### Cytology

Only recommended for smoker with irritable symptoms

### PSA

Predicts prostate volume

May identify cancer

Predicts progression of BPH

### Flow rate

Inaccurate if the voided volume < 125mL

Insufficient evidence to recommend a cutoff value

Qmax more specific than Qave

Normal values

Men < 40                      >= 21 ml/s

Men 40-60                    >= 18 ml/s

Men > 60                     >= 13 ml/s

Women < 50                 >= 25 ml/s

Women > 50                 >= 18 ml/s

Poorer outcomes after prostatectomy if Qmax >15ml/s

Qmax < 15 mL/s does not differentiate between obstruction and bladder decompensation.

### Post-void residual

Length x width x height x 0.7 (x 0.52 or pi/6 for prostate volume)

Significant intra-individual variability – at least 2 measurements

Poor correlation with other parameters

May predict a slightly higher failure rate with a strategy of watchful waiting, but threshold volume uncertain.

78% normal men have PVR > 5ml

100% normal men have PVR < 12 ml

?predicts renal insufficiency – Bates 2003 (2/93 patients with PVR > 250ml developed hydronephrosis and elevated creatinine – average PVR was 425 with an associated FR of <5ml/s)

No evidence that raised PVR a/w increased risk of UTI

#### Flexible cystoscopy

Risk of UTI ~2.5%

Features a/w obstruction

Occlusive prostate

High bladder neck

Trabeculation

Sacculation and diverticula

Bladder stones

Relationships generally not firm enough for prognostication, with the exception of bladder stones, which are clearly associated with BOO.

Trabeculation a/w BOO, but false negative in 15% and false positive in 8% (El Din 1996)

Not recommended unless haematuria, suspicion of calculi

#### Urodynamics

Reserved for:

Younger men (<50 yrs)

Equivocal uroflowmetry

Elderly patients

Flow rates > 15ml/s

Very low flow and suspected bladder failure

Patients with neurological symptoms or after radical pelvic surgery

Previous unsuccessful invasive treatment

Severe irritative symptoms

High pressure low flow predicts outcome after TURP

No value for UDS in predicting response to medical Rx

25% of patients with BOO and OAB have unstable bladder contractions after surgery

#### Natural history

Best evidence from PLESS and Olmstead County. Overall BPH considered a progressive disease. Symptom severity and frequency, bother, interference, disease-specific HRQOL, maximum flow rate, and prostate volume (TRUS) all tend to worsen with advancing age. Correlations generally weak except:

Symptoms with prostate volume   ✓

Symptoms with Qmax                   ✓

IPSS and Qmax                           ✓

IPSS and residual volume           ✓

Natural history has been assessed in 3 ways:

(i) Longitudinal cohorts of men with LUTS (watchful waiting)

(ii) Longitudinal cohorts of undiagnosed men (e.g. Olmstead County)

(iii) Non-intervention arms of controlled trials (e.g. Wasson 1995, PLESS, MTOPS)

(i) Watchful waiting

Few studies; problems with recruitment compliance and self-reporting

(ii) Olmstead County

Minnesota. Data reported by Mayo clinic group (Rochester, Minnesota) including Oesterling and Jacobsen.

Long term has shown:

Increased symptoms score with age	0.3-0.6/yr
Increased volume	0.6ml/yr
Reduced flow rate	-2% per year

Greatest degree of change older patients (>60) and those with initial poor baseline levels

(iii) Non-intervention arms

a) Wasson et al 1995 NEJM (updated by Flanigan 1998)

556 men with moderate symptoms/bother

Random assignment to WW vs. TUR

Initially 40% of patients in WW arm improved, 33% stayed the same and 27% crossed over to TURP, 21% for treatment failure (death, UTI, RV >350, stone, IPSS  $\geq$  24, doubled creatinine)

**At five years 36% had surgery and 64% stayed same/improved**

Interestingly patients initially randomised to WW did worse after TURP than those undergoing immediate TURP

b) PLESS (McConnell 1998)

Placebo arm (n=1504)

Stratified according to prostate sized estimated on PSA

Significant placebo effect impairing true natural history

Reduced symptom score (-1) and peak flow rate, decreased flow rate over 4 years

7% AUR and 8% TURP

c) MTOPS

Placebo arm (n=737)

Clinical progression in only 17 % of patients in placebo arm at end of study; however lesser degrees of deterioration not discussed

Results for placebo group below:

Event	Rate / per 100 person yrs	Cumulative incidence (%)
Clinical progression	4.5	17
$\geq$ 4 points IPSS increase	3.6	14
AUR	0.6	2
Incontinence	0.3	<1
UTI	0.1	<1
Renal insufficiency	0.0	0
Invasive therapy	1.3	5

Predictors of progression (6)

Baseline (6)

**Age > 60**

**Prostate volume > 30 ml**

**PSA > 1.4**

Symptom score > 7 (IPSS)

Qmax < 12 ml/s

PVR > 50 ml

Dynamic (5)

Increasing IPSS  
Increasing bother  
Previous AUR  
Increasing PVR  
Failure to respond to medical therapy

**Complications of BPH**

Symptom progression	17-40%
AUR	1-2% per year
UTI	0.1% -12%
Bladder calculi	0.3-3.4%
Renal insufficiency	<2.5%
Incontinence	>1%
Haematuria	

**AUR due to BPH**

In at-risk populations:

0.68 per 100 person years Olmstead County  
0.6 per 100 person years MTOPs  
1.8 per 100 person years PLESS

May be spontaneous or precipitated

Cause of spontaneous retention unclear (?infection, overdistension, sexual activity). Role of infarction controversial

Increased risk with:

Increased age (4th to 7th decade = 8 fold)  
Increased symptoms (IPSS > 7 = 3 fold)  
Poor flow rate (< 12mls/sec = 4 fold)  
Larger prostates (> 30mls = 3 fold)  
Larger PVR (> 50mls = 3 fold)

**Management**

Watch and wait

Medical therapy

Alpha blockade  
5 alpha-reductase inhibitors  
Phytotherapy

Surgical intervention

Other

Prostate luminal stents

Conservative therapy

Suitable for mild/moderate symptoms with minimal bother

Approximately 2/3 stay the same or improve at 5 years without Rx

Remember to counsel re. prostate cancer – multiple studies have shown that men with LUTS have no increased risk of prostate cancer cf. asymptomatic men of same age

Lifestyle changes important [reduced caffeine and fluid, treat constipation, bladder retraining etc.]

Medical therapy

a) 5 alpha reductase inhibitors (Type II 5-ARI dominant isoform)

Finasteride

**Type 2 5ARI**

Reduces prostate volume ~20-30%

Improves symptom scores ~15%

Improves urinary flow ~ 1.5%

Maximal effect only after 6 months

Durable effect lasting at least 10 years

More effective in larger prostates > 40ml

Efficacious in reducing haematuria due to BPH\*

Reduces total PSA by ~50%. Conflicting evidence of effects on free PSA

No evidence that impairs the detection of prostate cancer on Bx

Side effects

Reduced libido

Erectile dysfunction (5%)

Reduced ejaculate volume

Rarely rash and breast symptoms (~1%)

\* 75% experienced no further bleeding at mean follow-up 3 yrs  
(Kearney 2002; n= 57)

Dutasteride

**Type 1 and Type 2 (dual) 5ARI**

Very little evidence to suggest superiority of dutasteride over finasteride despite improved suppression of DHT

EPICS study (Enlarged Prostate International Comparator Study) showed exactly the same reduction in volume (27.4%) and similar improvements in IPSS (~ 6 points) at 12 months

b) Alpha adrenoceptor blockers

First introduced in late 1970s

Phenoxybenzamine used but high side-effect profile

Selective alpha-1 adrenoceptor blockers better tolerated

Similar efficacy and side-effect profile

Thought to reduce dynamic element of obstruction by reducing smooth muscle tone – however no improvement in UDS features of obstruction with alpha blockers ? central mechanism

Djavan and Marberger meta-analysis 1999 (cf. placebo)

**30-40% improved symptoms**

**16-25% improved flow rate, average 3ml/s**

Side effects

Dizziness

Postural hypotension

Asthenia

Nasal congestion

Retrograde ejaculation (lowest rates with alfuzosin)

Erectile dysfunction (~5%)



Floppy iris syndrome reported with tamsulosin but believed to be a class effect – makes cataract surgery difficult by causing relaxation of iris dilator muscle

c) Combination therapy

Rationale for combination 5ARI and alpha blockers well established  
Combination therapy more effective than either drug alone in reducing clinical progression (IPSS score, AUR, surgery; see MTOPS/COMBAT in appendix)

RCT comparing combination therapy for 9 months with cessation of alpha blocker at 6 months (SMART-1) showed worsening of symptoms in 16% and 42% of men with moderate and severe symptoms respectively (Barkin 2003).

d) Phytotherapy

Saw Palmetto

Bent 2006 NEJM – very tightly controlled RCT using taste/smell matched placebo in 225 men with moderate/severe LUTS. No difference in either symptom score or flow rate after 12 months. Recently corroborated by Cochrane database (Tacklind 2009), in contrast to previous findings (Wilt 2002)

NB. Saw Palmetto does not influence PSA levels, PC-SPES does however

e) PDE5 inhibitors

PDE5 isoenzymes isolated from prostate

Severe LUTS a/w increased risk of ED

Recent studies suggest improvement in LUTS with PDE5i over placebo.

Possible additive effect of combination therapy with alpha-blockers

Mechanism unknown

Surgical management

Indications for surgery (RUSHES)

R - Recurrent or refractory urinary retention

U - Recurrent UTIs

S - Bladder stone

H - Haematuria refractory to 5ARI therapy

E - Elevated creatinine due to BOO

S - Symptom deterioration despite maximal medical Rx

Endoscopic

TUIP

Electrosurgical TURP

Laser TURP

Green Light

HOLEP

Thulium

Open

Millen's retropubic prostatectomy

Transvesical prostatectomy

Choice of procedure depends on prostate size:

**<30ml**      TUIP equivalent to TURP in patients with no middle lobe  
 TUIP a/w reduced complications vs. TURP

**30-80ml**      TURP Rx of choice  
 A/w improvement in 70%  
 Only beneficial in men with moderate/severe IPSS  
 Flow rate and RV improved in majority  
 Nocturia can remain problematic  
 Risks of TURP\*

Infection	4%
Bleeding	2% transfusion rate
DVT/PE	
Asymptomatic DVT	10%
Symptomatic VTE	0.6%
BN contracture	4%
Urethral stricture	4%
Impotence	6.5%
Retrograde ejaculation	68%
Incontinence**	2%
TUR syndrome	0.5%
Death	0.2%
Re-operation	1% per year

\* Increased with large glands, resection time >90mins, AUR, renal insufficiency, age >80 yrs, blacks

\*\* Up to one third of patients experience transient incontinence after TURP which typically settles

Data from National Prostatectomy Audit 1997 (DE Neal)

#### Alternatives

##### Bipolar TURP

16 RCTs (Mamoulakis C)

Minimal long term data

Reduced TUR syndrome, clot retention, irrigation and catheterisation

Equivalent short-term efficacy

##### HOLEP

4 RCT vs. TURP

Longer resection time (morcellation), but:

Reduced bleeding, catheterisation, stay and more tissue resected

Equivalent efficacy and sexual function

##### Green light laser

Nd-YAG (1064nm) laser with frequency-doubling crystal to produce green light. Originally potassium titanyl phosphate crystal (KTP-80W), now lithium borate crystal (LBO-120W).

4 RCTs vs. TURP (best Costello 2010)

Reduced catheterisation/stay

Similar efficacy and sexual function

BUT higher re-operation rate and inferior outcome  
in glands >70cc

**>80ml**

Open prostatectomy

Millen's retropubic prostatectomy procedure of choice

Direct visualisation of adenoma

Accurate determination of distal extent of enucleation  
(preserves sphincter)

Clearly identifiable bleeding points

No bladder trauma

Complications

Retrograde ejaculation 80-90%

Erectile dysfunction 5%

Bladder neck contracture 5%

Haemorrhage <5%

Stress incontinence <1%

DVT/PE <1%

Transvesical prostatectomy (aka suprapubic prostatectomy) a/w  
higher complication rate. Rarely performed except with:

Large bladder calculi

Diverticulectomy

Very large median lobe

Alternatives

HOLEP

3 RCTs

Longer duration

Reduced bleeding, catheterisation, stay and more  
tissue resected

Equivalent efficacy and sexual function

Results out to 5 yrs (Kuntz 2008)

### Other alternatives

#### (i) TUNA

Radiofrequency ablation at 490kHz

Fibreoptic visualisation of needle insertion

Can be performed under LA/sedation

40% initial retention

40-60% patients improved

Limited long-term data

20% other Rx at 5 years

#### (ii) TUMT

Prostatron (Technomed), Prostcare (Brucker), Prostalund (Lund)  
and Targis (Urologix)

Microwave generator and cooling mechanism to prevent urethral  
injury

Poor results with low-energy protocols

Improved outcomes with high energy protocols but still inferior to  
TURP

Side-effects perineal pain and need for prolonged catheter  
drainage

(iii) HIFU

- General anaesthesia/heavy sedation required
- Improvement in 40-50%
- Long-term data unavailable
- No RCTs

(iii) Prostatic stents

- Two types; permanent and temporary
- Permanent first described – most widely known UroLume (AMS)
- Initial reports suggested high voiding rates in men with previous urinary retention and relatively low complication rates (Chapple 1990)
- Larger studies with longer follow-up identified difficult deployment and significant long-term complications
  - Painful ejaculation
  - Stent migration
  - Epithelial hyperplasia
  - De-novo bladder irritation
- Removal rate almost 50% on long-term follow-up – most within 2 years

## Appendix

### IPSS score

Symptoms / Score	Not at all	Less than 1 time in 5	Less than half the times	Around half the times	More than half the times	Almost always
Do you have a sensation of not emptying your bladder completely after you finish urinating?	0	1	2	3	4	5
Do you have to urinate again less than 2 hours after you finish urinating?	0	1	2	3	4	5
Do you stop and start several times when you urinate?	0	1	2	3	4	5
How often is it difficult to postpone urination?	0	1	2	3	4	5
Do you have a weak urinary stream?	0	1	2	3	4	5
Do you often have to push or strain to begin urination?	0	1	2	3	4	5
	Never	1 Time	2 Times	3 Times	4 Times	5 Times
How many times do you get up to urinate from the time you go to bed at night until you get up in the morning?	0	1	2	3	4	5

Not a perfect questionnaire. Does not diagnose bladder outflow obstruction. 3 of 7 questions related to storage.

### Polyuria

> 3L per day

Perform urine osmolality

If > 250 mosm/kg solute diuresis (DM, post-obstructive, post-op)

If < 250 mosm/kg water diuresis (DI, polydipsia)

### Nocturnal polyuria

> one third of daily output over 8 hours of sleep

Solute diuresis due to nocturnal natriuresis (?ANP production due to recumbency), therefore **not** secondary to impaired ADH secretion at night

Unknown cause

Fluid restriction

Diuretics

DDAVP

No real rational but can help

Hyponatraemia in 5% - check U+E for first 3 days after commencing

Avoid in elderly and cardiac failure



Important medical trials in BPH

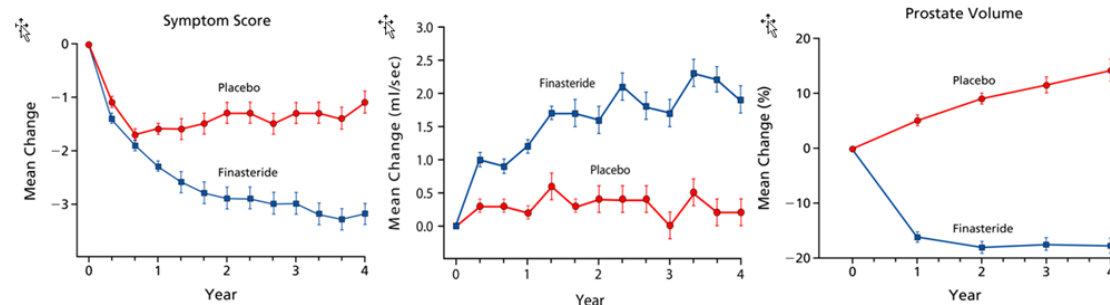
## i) PLESS (McConnell 1998; n=3040; 4 year follow-up)

Proscar long-term efficacy and safety study

Moderate/severe symptoms; reduced flow and PSA &lt;10

Finasteride 5mg vs placebo; randomised 1:1

Primary endpoint I-PSS score



Reduced volume by 18%, improved symptoms score by 1.6

points and improved flow by ~2ml/s

Reduced risk of surgery and acute retention of ~55%

Side effects

Reduced libido	6.4%
Impotence	8.1%
Reduced ejaculate volume	3.7%
Rash	<1%
Breast enlargement/tenderness	<1%

(ii) MTOPS (McConnell 2003; n= 3047; 4.5 yr follow-up)

Medical therapy of prostatic symptoms

Men &gt;50 yrs, IPSS &gt;7, flow &lt;16ml/s

Finasteride 5mg, doxazosin 4mg and doxazosin 8mg

Doxazosin commenced at 1mg and doubled weekly to 8mg.

Those unable to tolerate 8mg given 4mg. Numbers of patients receiving reduced dose not mentioned in text

Primary endpoint – time to clinical progression

Clinical progression defined as:

IPSS ≥ 4 point increase (on 2 occasions within 4 weeks)

AUR

Recurrent UTI

Renal insufficiency (≥50% rise in baseline serum creatinine and ≥1.5 mg/dl (creatinine 133ug/l))

Incontinence

Outcomes (see below)

Essentially

Only 17% of patients in placebo group progressed

Vast majority due to raised IPSS score (~80%)

No patient developed acute renal insufficiency (however mean PVR was only 40ml)

Combination therapy reduced risk of clinical progression by ~ two thirds when compared with placebo.

## 5 $\alpha$ reductase Inhibitors

• MTOPS : Primary end point events

	Placebo (%)	Doxazosin (%)	Finasteride (%)	Combination (%)
Progression	17	10	10	5
IPSS	14	7	9	5
AUR	2	1	<1	<1
Incontinence	<1	<1	<1	<1
UTI	<1	<1	0	<1
Intervention	5	3	2	1

*McConnell et al NEJM 2003*

## MTOPS Results Summary At 4 Years

■ Reduction in risk of BPH 'Clinical' Progression\* (primary endpoint)

- Combination 66% (p<0.001)
- Finasteride 34% (p=0.002)
- Doxazosin 39% (p<0.0010)

■ Reduction in risk of other endpoints:

	AUR	Invasive Therapy
- Combination	81% (p<0.001)	67% (p<0.001)
- Finasteride	68% (p=0.009)	64% (p<0.001)
- Doxazosin	35% (p=0.23)	3%

■ Improvement in:

	Symptoms	Qmax
- Combination	7 points (p<0.001)	3.7ml/s (p<0.001)
- Doxazosin	6 points (p<0.001)	2.5ml/s (p<0.001)
- Finasteride	5 points (p<0.047)	2.2ml/s (p<0.047)
- Placebo	4 points	1.4ml/s

(iii) COMBAT (Roehborn 2009; n=4844; 4yr follow-up)

Analysed combination of dutasteride and tamsulosin vs. either drug alone in men > 50 yrs with IPSS $\geq$ 12, vol $\geq$ 30 and flow between 5 and 15 ml/s

**No placebo arm – considered unethical.** Therefore can only compare combination with single drug therapy. No assessment of placebo effect, which is substantial in trials of this type. Primary endpoint different to MTOPS: AUR or surgical intervention. Combination therapy superior to tamsulosin but not dutasteride for preventing AUR or surgery. Better symptom control than either drug. Better flow rates and prostate volumes with dutasteride, but no additional effect with combination therapy.

Dropout rate slightly higher side-effect profile cf. either drug alone but similar dropout rate (see below).



## 5 $\alpha$ reductase Inhibitors

- COMBAT : Combination therapy

	Tamsulosin	Dutasteride	Combination
<i>n</i>	1611	1623	1610
Adverse events	8.4%	6.7%	9.6%
Withdrawal	22%	20%	21%

Roehrborn et al. J.Urol 2008

## 5 $\alpha$ reductase Inhibitors

- COMBAT : Combination therapy

	Tamsulosin	Dutasteride	Combination
IPSS	-26%	-30%	-37%
Q Max	+8%	+18%	+22%
Prostate Volume	0%	-22.8%	-23.4%

Roehrborn et al. J.Urol 2008

### (iii) Alf-AUR (McNeill 2005)

ALFAUR trial - Alfuzosin 10mg od two doses a/w increased likelihood of successful TWOC cf. placebo (62% vs. 48%; relative risk of failure reduced by 27%). Risk reduction maintained in groups at high risk of failure (age > 65; residual > 1L). Of those with successful TOV, alfuzosin reduced need for surgery over the next six months by 29%.

NICE guidelines for male LUTS (published May 2010)

Coalescence of evidence from ICUD, Cochrane database, meta-analyses

Essentially:

- History and examination

- Frequency voiding chart mandatory to exclude nocturnal polyuria syndrome

- Urinalysis

- Flow rate and residual

- U+E only if renal impairment suspected

- Reassurance only for mild LUTS

- Medical therapy for moderate/severe LUTS

  - Initially alpha-blocker

  - 5-ARI for LUTS and large prostates

  - Consider adding in anticholinergics

- Surgery

  - Not recommended

    - Vaporisation techniques

    - Botox injections

    - Green light laser (RCTs not considered good enough)

### TUR syndrome

#### Triad of **fluid overload, dilutional hyponatraemia and neurotoxicity**

Relatively uncommon

Complicates ~ 0.5% monopolar TURPs

Due to absorption of hypotonic irrigant. Average fluid absorption 20ml/min (1200ml/hour). Glycine particularly problematic as metabolised to ammonia which causes encephalopathy. Glycine itself is a neurotransmitter for the eye, which may explain visual disturbances.

#### Risk factors

- Duration > 90 mins
- Large gland > 45cc
- Early capsular perforation
- Smoking
- Inappropriate irrigant height

#### Symptoms

- Confusion
- Agitation
- Nausea and vomiting [Glycine] > 10mmol/l
- Headache
- Visual disturbance [Glycine] > 5mmol/l
- Seizures
- Coma

#### Signs

- Hypertension
- Bradycardia
- Hyperkalaemia
- Hyponatraemia

#### Diagnosis

- Serum [Na] < 125 mmol/l

#### Avoid it

- Continuous irrigating resectoscope (of Iglesias)
- Limit resection time
- Avoid capsular perforation
- Height of irrigant no more than 60cm above pubic symphysis (doubles if raised from 60-70cm)
- Bipolar TURP

#### Recognise it

- Input/output
- Table weight
- Alcohol in irrigant and breathalyser
- Spinal anaesthesia
- Bradycardia/hypertension

#### Treat it

- Terminate procedure as quickly as possible, but ensuring adequate haemostasis (prolonged irrigation undesirable)
- IV diuretics
  - 1g/kg IV mannitol 20% solution over 30 mins (for 70kg man = 350mls)
  - 40 mg IV frusemide

Theoretically mannitol makes more sense than frusemide and conserves Na, but as more free water is lost than Na, probably makes little clinical difference

Transfer to critical care

Consider Na replacement using hypertonic saline. Campbells suggest 200ml 3% saline, very slowly over a period of time! NB. care needed as may precipitate central pontine demyelination